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ASCENT OF STROMBOLI YELLOW PUMICE MAGMAS: EXPERIMENTAL SIMULATION AT P ≤ 4 KB

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Stromboli volcano is characterised by a persistent, mildly explosive activity producing a crystal-rich HK- basaltic scoria. The normal activity is periodically interrupted by more energetic explosions during which a crystal-poor HK basaltic pumice is emitted (yellow pumice), often intermingled with the crystal-rich scoria. We experimentally investigated the ascent path of the yellow pumice from the inferred depth of segregation ~12 km to a very shallow level, where it interacts with the already degassed resident magma. We ascribe to volatiles a principal role for magma evolution at Stromboli. The yellow pumice starting composition (SiO₂ = 49.4 wt %, K₂O = 1.9 wt %, MgO = 8 wt %, Cr = 259 ppm, Ni = 74 ppm, CaO/Al₂O₃ = 0.79) was erupted during the 1930 paroxysm. Mineral assemblage is: cpx (Wo₄₅Fs₁₂) ? ol (Fo₈₅) > plg (An₇₅). The pumice was fused at 1400°C, 1 atm for 3 hrs and the resulting crushed glass was used as starting material. Ca. 30mg of the starting glass were loaded in either Au₇₀-Pd₃₀ or Au₉₀Pd₁₀ capsules with a water content variable from saturation to almost anhydrous. Sample capsules were then loaded in an IHPV equipped with a fast-quench device and pressurized with Ar-H₂ gas mixtures. A NiPd-NiO sensor was loaded adjacent to the experimental capsules in order to have a careful estimate of the fH₂ of each run. Four crystal-free hydrated glasses were analysed for H₂O by KFT and FTIR in order to provide a calibration for H₂O determination by electron microprobe in crystal bearing experimental charges (by difference method). We present here the result of an isothermal section (1100 °C), in the P range 0.5 - 4 kb, at an fO₂ range: NNO + 0.5 / + 1.2. At 4 kb for the range of water content investigated, clinopyroxene (Wo₄₆Fs₉En₄₅) is the liquidus phase and is joined by olivine (Fo₈₄) for H₂O ≤ 1.7 %). At 3 kb cpx is the only phase present for melt water content above 3.6 wt %;

below this water content, ol joins cpx on the liquidus. The onset of plg crystallization is placed at water content $< 1.2\%$. At 2 kb and 3.0 % H₂O the liquidus assemblage is cpx (15 vol %) and ol (3 vol %). Plg appears on the liquidus at 1.6 wt % H₂O. At 1 kb cpx + ol coprecipitate for all water contents investigated (3.1 to 2.1 wt %), while plagioclase was not encountered. Plg is instead always present with cpx and ol in experiments at the lower pressure investigated (0.5 kb) for H₂O $\leq 2.1\%$.